

The Panama Canal

Drilling on Contractor's Hill at Culebra Cut, January 1912.



Goethals Collection, U.S. Military Academy Library



Culebra Cut.

In the early morning of May 4, 1904, a young second lieutenant crisply walked into the old French hotel in Panama City. He exchanged brief greetings with officials of the new French Panama Canal Company. The company, which had succeeded Ferdinand de Lesseps' bankrupt enterprise in 1894, had been no more successful than its predecessor in its effort to build a canal across the Isthmus of Panama connecting the Pacific and Atlantic oceans. Its workers ravaged by malaria, its equipment in a state of disrepair, the company was ready to sell all of its assets to the United States government for \$40 million. The lieutenant carefully read the document of transfer. Then, following the directions of the American secretary of war, he signed his name to the receipt: "Mark Brooke, 2nd Lieutenant, Corps of Engineers." The French effort was over. The American attempt was about to begin.

Building the Panama Canal required the assistance of the foremost engineers of the day. Major William M. Black, who later became Chief of Engineers, supervised early

engineering activities at the canal. John F. Wallace, first civilian chief engineer on the project, brought railroad construction and operations expertise to the Isthmus. His successor, John F. Stevens, continued his endeavors and established the basic plan for the construction of the canal. He resigned, however, in 1907 when he was severely criticized in the United States. Frustrated by his inability to find a civilian willing to see the project through to completion, President Theodore Roosevelt turned for help to the Corps of Engineers. "We can't build the Canal with a new chief engineer every year," he said. "Now I'm going to give it to the Army and to someone who can't quit." He requested the Panama Canal Commission to appoint Engineer officer Lieutenant Colonel George W. Goethals as chief engineer and commission chairman. Engineer officers Major William L. Sibert and Major David D. Gaillard, both West Point graduates like Goethals, also served on the commission. All three men received promotions during the time they worked on the canal.

West chamber of Gatun Upper Locks, March 1912.

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Pedro Miguel Locks under construction, January 1911.

Within a year Goethals reorganized canal operations into three geographical divisions. Sibert took charge of the Atlantic Division, and Gaillard took the Central Division. To head the Pacific Division, Goethals selected Sydney B. Williamson, a civilian engineer who had won his respect when the two had worked together earlier at Muscle Shoals. The civilian engineers under Williamson engaged in a spirited competition with the military engineers. Goethals encouraged this competition to achieve maximum economy while speeding construction. Rear Admiral Harry H. Rousseau, Chief of the Bureau of Yards and Docks of the Navy, assumed responsibility for the design and construction of terminals, wharves, docks, warehouses, machine shops and coaling stations. Civilian engineer Ralph Budd directed the relocation of the Panama Railroad from 1907 until 1909, when he was succeeded by Lieutenant Frederick Mears of the Corps of Engineers.

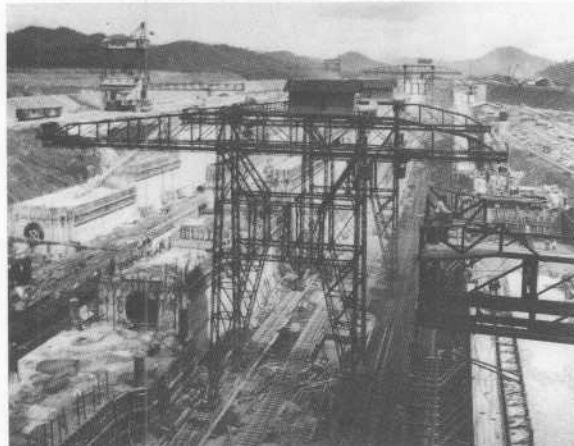
In the 1880s the French had learned after several years of effort that a sea-level canal across Panama was an impossibility. Locks were absolutely necessary. Benefitting from French mistakes, Americans never seriously considered anything other than a canal utilizing locks. They erected a monumental dam across the Chagres River, thereby creating Lake Gatun. At each end of the lake, the engineers constructed locks. The Gatun Locks lead to the Atlantic. The Pedro Miguel Locks lead to Miraflores Lake and, farther on, Miraflores Locks. From these locks ships travel on to the Pacific.

Major Gaillard directed the huge engineering task of completing the Culebra Cut through the continental divide, which required the excavation of 96 million cubic yards of rock and dirt. Spectacular landslides at the Cut were the greatest engineering difficulty. The amount



Work in progress.

Office of History, Corps of Engineers



Miraflores Lower Locks, August 1912.

Goethals Collection, U.S. Military Academy Library

U.S. Aircraft Carrier
Saratoga in Gaillard Cut,
February 1928.



Office of History, Corps of Engineers

of earth that had to be removed was nearly double the original estimate. More than 100 steam shovels removed most of the soil, and flatcars hauled it out. Trains departed at 13-minute intervals to keep pace with the steam shovels.

Construction of the Panama Canal was never the responsibility of the Army Corps of Engineers, but having engineer officers supervising the project enabled problems to be resolved easier than before, if not always to everyone's satisfaction. For instance, in 1910 President William Howard Taft dispatched Brigadier General William L. Marshall, then Chief of Engineers, to the Canal Zone when a disagreement arose between Goethals and Sibert over the design for the floor of the upper lock at Gatun. Sibert insisted on a gravity section to resist the upward pressure of the full Gatun Lake level, which would act as a lifting force whenever the upper chamber was unwatered. He also wanted to anchor the floor to foundation rock with bent steel rails left by the French. Goethals believed this an extravagant double precaution. He had promised to construct the canal within cost estimates and was unwilling to authorize the additional work Sibert desired.

While not criticizing Goethals' concern for staying within the budget, Marshall decided that Sibert was right. He recommended to President Taft that the double safety factor be adopted. To make sure that Goethals understood he

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S.S. *Cristobal* in Gatun
Upper Locks, August 3,
1914.

meant what he said, Marshall told him, "I'm going to advise Mr. Taft to keep you both where you are, BUT if you can't get along together, I'm going to advise his keeping Sibert here and ordering you elsewhere." This apparently cleared the air, and the two engineer officers worked together to complete the canal within estimates.

The Panama Canal opened ahead of schedule on August 15, 1914. The total excavation for the channel exceeded 200 million cubic yards, of which almost half was taken from the Culebra Cut, later renamed Gaillard Cut in honor of the officer who conquered it, but who tragically died of a brain tumor in 1913 without seeing the canal's completion.

Army engineers retained a unique relationship with the Panama Canal after the canal was opened. Engineer officers traditionally served as the Governor and Lieutenant Governor of the Panama Canal Zone. The Governor also served as President of the Panama Canal Company, which was actually responsible for canal operations.

In the years immediately after the canal's completion, the Corps of Engineers accepted the responsibility for dredging the channel, which continued frequently to be blocked by landslides. Engineers finally determined the proper incline for the banks that provide the greatest insurance against slides. In the 1920s, the Corps further strengthened the banks by developing a system of drainage control. Still later, Army engineers helped enlarge the canal, although the original locks are still in use. One of the most unusual ways Army engineers assisted canal operations occurred in 1968, when the Corps sent the *Sturgis*, the world's first floating nuclear power plant, to the Canal Zone in order to alleviate dangerous reductions of electrical power caused by necessary curtailment of operations at

the Gatun Hydroelectric Station. The weather had been so dry that there was not enough water to operate the locks as well as supply the turbines. The 10-megawatt floating station fulfilled a critical need, helping save over one trillion gallons of water for lock operations that otherwise would have been used for electrical generation.

Engineer officers have also periodically assisted in studies on other canal routes across Central America. Army engineers conducted a survey for a route across Nicaragua in the 1930s. In the 1960s, they were heavily involved in studies on an alternate Panamanian route that would accommodate larger vessels.